

Revisions to the PIV Biometrics Specifications

800-76-1 → 800-76-2

Biometrics Consortium Meeting
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US Department of Commerce

Agenda

- Review industry trends in access control
- Fingerprint updates
 - **Exception handling**
 - **Leveraging “lessons learned” on fingerprint enrollment**
 - **MINEX -- Level II Performance + Conformance Specification**
- Second and third modalities
 - **Iris**
 - **Face specifications exist for cards today**
- Next step: Revision of NIST Special Publication 800-76-1
 - **Release for public comment ~ October 2010**
 - **Second or final publication ~ January 2011**

1. **Notes on industry trends for access control**
2. Fingerprint updates
3. Second modalities
IRIS, MOC etc
4. Next steps

Part 1: Biometrics for Access Control

PIV Biometric Access Control



Biometric Industry Trends

- More devices
 - Single modalities and multiple modalities
- Smaller devices
 - Mobile capture
 - Iris, Face, Finger
- Standoff capture
 - Iris, Face gates and portals
- PACS systems using Face Recognition
 - Based on e-Passport
- One-to-one operation
 - With token
- One-to-many operation
 - Without token



For example...

1. Notes on industry trends for access control
2. **Fingerprint Updates**
3. Second modalities
IRIS, MOC etc
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Part 2: Fingerprint Updates

Fingerprint exception handling

- Install the content of the December 2008 biometric FAQ specifications

http://www.idmanagement.gov/content/hspd12_faqs_biometric.htm

into the upcoming revision of NIST SP 800-76.

- These cover the cases:
 - **Zero fingers available (e.g. amputees) – install signed empty object on card**
 - **One finger available – acquire two impressions of the finger, and install signed object on the card**
 - **Poor quality during enrollment**
 - **Failed biometric verification attempt**

FUTURE

- Cross-vendor interoperability specification
 - Templates must be accurately matched by certified matching algorithms
 - Matchers must accurately match certified templates
 - FNMR < 0.01 at FMR = 0.01
- Higher bar accuracy specification
 - FMR < 0.0001
 - FMR < 0.00001
 - Pooled templates
 - One + two finger authentication
- Threshold calibration
- Conformance
 - Of template generators

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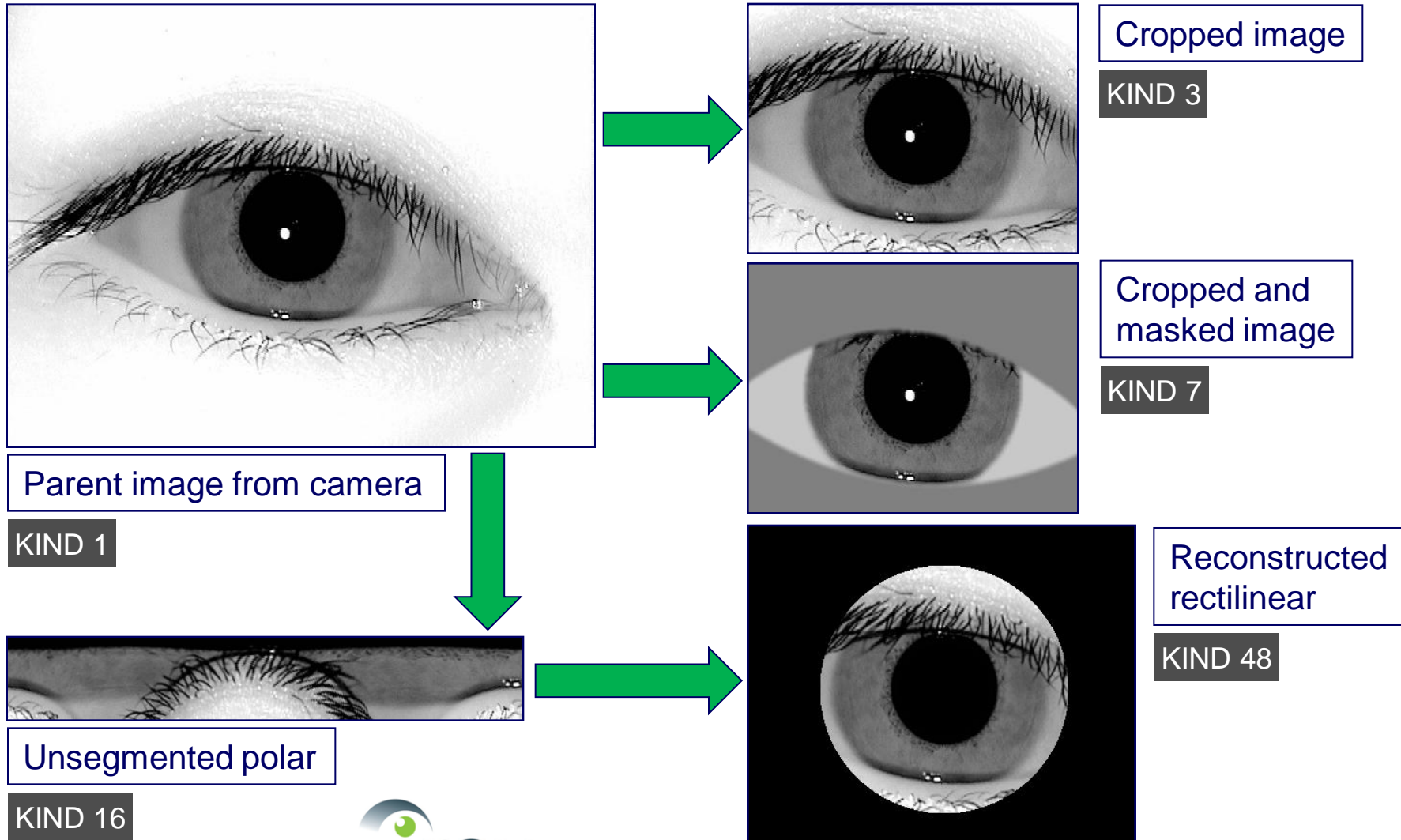
Part 3: Second Modalities

- Fingerprint minutia (PIV mandatory) **NOW**
 - Minutiae from two fingers, standardized in INCITS 378
 - Record size is 500-700 bytes (excluding signature)
 - Supported by MINEX (Minutiae Exchange) tests and GSA certification
- Facial image (PIV optional) **NOW**
 - Single frontal face image, standardized in INCITS 385
 - Record size is approximately 20KB
 - Image is suitable for face recognition (both human and automated)
 - Specification is closely that of the e-Passport
- Iris Image (Specifications to appear in SP 800-76-2)
 - Images of one or two irises, standardized in ISO/IEC 19794-6:2011
 - Record size is approximately 3KB
 - Image is suitable for biometric verification

IREX Test (Support for 1:1 and 1:N)

- NIST Interagency Report 7629, Sep 21, 2009
 - *Performance of Iris Recognition Algorithms on Standard Images*
- Quantitative support for ISO 19794-6 standard
 - Image size is about 3KB (for 1:1) and ~30KB (for 1:N)
 - Compression, cropping, formatting profiles
 - Speed-accuracy trade space
- Ten implementations of standardized interoperable iris image format
 - Num. iris providers has expand x10 in last five years
 - Num core technology providers in iris exceeds that for face recognition
- Iris image interoperability superior to minutia interoperability
 - Less dependency on the product that prepares the record
- <http://iris.nist.gov/irex> (or google “iris interoperability”)

IREX :: Proposed standard formats

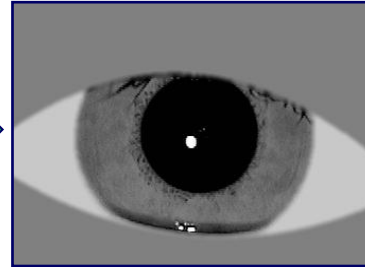


Use images, not templates



Parent image from camera

KIND 1



Cropped and masked image

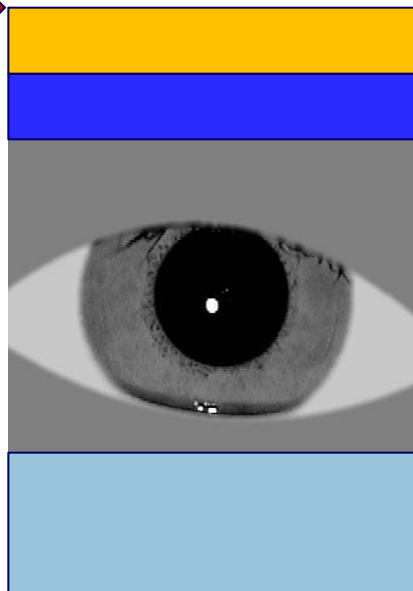
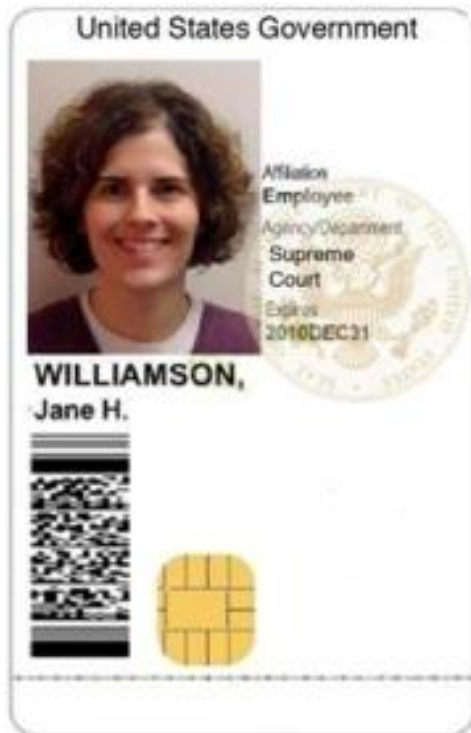
KIND 7

- Standard defines interoperable images
 - **PIV will use these**
 - **US Registry of Biometric Standards will recommend these.**
- Templates are
 - **Proprietary, non-interoperable**
 - **Laden with intellectual property**
 - **Sometimes larger than the image itself**
 - **Not suitable for interoperable USG applications**

Irises on PIV Cards

Following the arrangement of fingerprint minutia data on current PIV cards... Two irises in one container.

Tagged biometric container (SP 800-73)



CBEFF
Header

=88 bytes

ISO Iris
Image
Header

≥ 107 bytes

ISO Iris
Image
Data

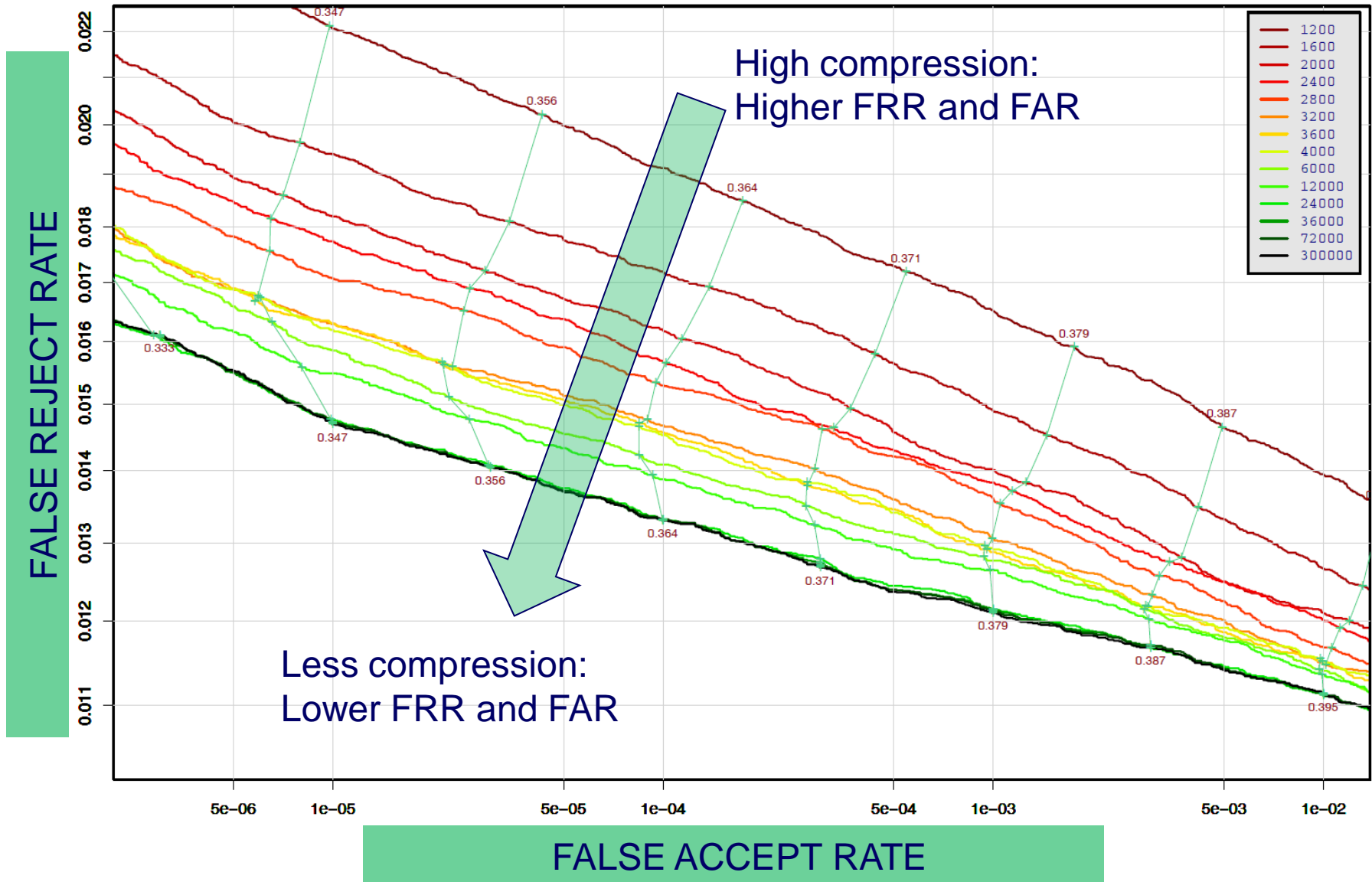
$\sim 2 * 3\text{KB}$

CBEFF
Signature
block

~ 500 bytes










2.65M cards issued 07/2009

Recognition Error Under Compression



Compression + Format Recommendations

- Compression - Don't do it!
 - Lossy compression does incremental damage to images.
 - Either no compression, or lossless may be sufficient.

Role	Recommended		Target Record Size								
	Format	Compressor	2KB	4KB	8KB	16KB	32KB	64KB	128KB	256KB	307KB
All	KIND 1	Uncompressed									
All	KIND 3	Uncompressed									
All	KIND 7	Uncompressed									
All	KIND 3	PNG Lossless									
All	KIND 7	PNG Lossless									
1:N	KIND 3	JPEG 2000 Lossy									
1:N	KIND 7	JPEG 2000 Lossy									
1:1	KIND 3	JPEG 2000 Lossy									
1:1	KIND 7	JPEG 2000 Lossy									

20-70KB for 1:N

3KB for 1:1

Commercial entities (partial list)

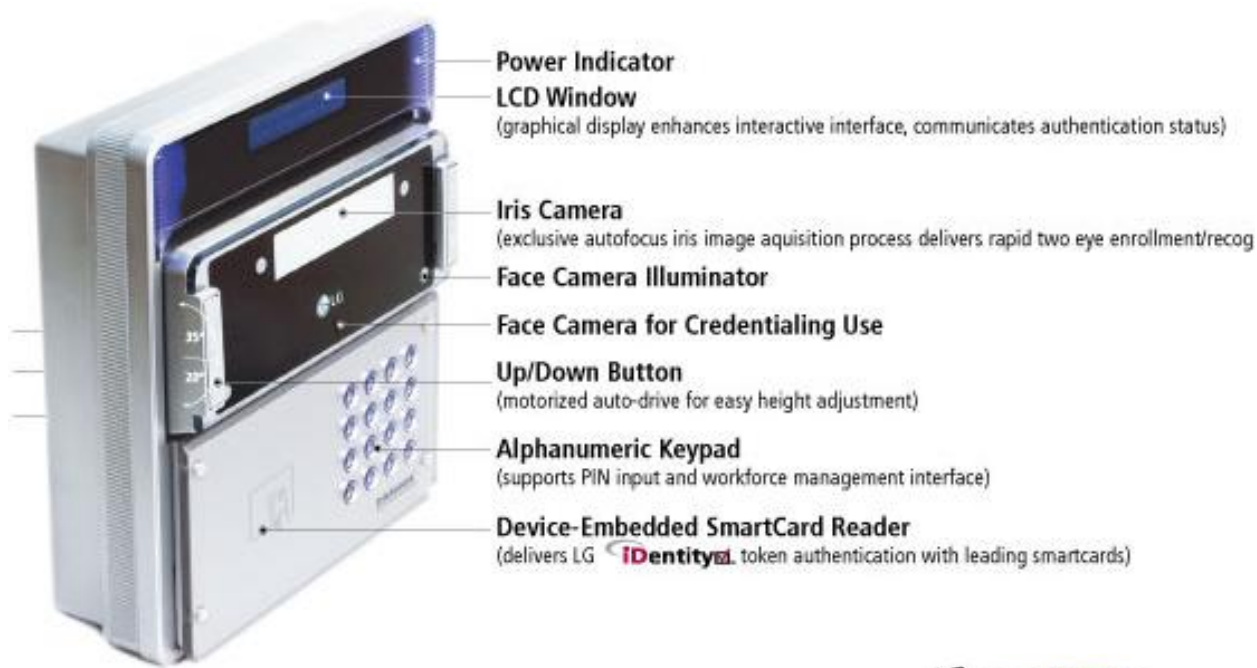
IRIS CAMERAS

- Short distance
 - Crossmatch (US)
 - IrisID (LG) (US/KR)
 - Iris Guard (SU)
 - Jiris (KR)
 - Kalo-vision (US)
 - Kynen (US)
 - L1 (Securimetrics) (US)
 - Oki (JP)
 - Panasonic (JP)
- Distance
 - Aoptix (US)
 - Honeywell (US)
 - Hoyos Group / GRI (US)
 - L1 (US)
 - Sarnoff Corp (US)

IRIS RECOGNITION

- Aoptix (US)
- Cambridge University (UK)
- Cogent systems (US)
- Crossmatch Tech. (US)
- Honeywell (US)
- Iritech (KR)
- Jiris (KR)
- Kalo-vision (US)
- L1 (formerly Iridian) (US)
- LG (KR)
- Neurotechnology (LI)
- Smart Sensors (UK)
- MorphoTrak (FR/US)
- Sarnoff (US)

Iris cameras I



Iris Acquisition III – Stand-off capture



Walk-up-and-stop
Kiosk-style



Portal, walk through style



THANK YOU

INPUT IS WELCOME

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